

12-5: Adding Probabilities

00 ← - Mutually Exclusive ; Inclusive Events

CANNOT occur at the same time

Ex: even and odd

Ex: rolling a 2 and 4 in one roll

$$P(A \text{ or } B) = P(A) + P(B)$$

Ex: Roll a dice $P(4 \text{ or } a 6) = \frac{2}{6} = \frac{1}{3}$
 $= P(4) + P(6) = \frac{1}{6} + \frac{1}{6}$

Ex: A collector has 8 baseball, 5 basketball and 6 football cards.

$$P(\text{baseball or basketball}) = \frac{8}{19} + \frac{5}{19} = \frac{13}{19}$$

Ex: 7 girls and 6 boys are on the royal ball committee. A group of 4 is chosen at random. Find

$$P(\text{at least 2 girls}) = \frac{7C_2 \cdot 6C_2}{13C_4} + \frac{7C_3 \cdot 6C_1}{13C_4} + \frac{7C_4}{13C_4}$$

2 girls 3 girls 4 girls

Ex: Pick a Queen and heart overlap

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

overlap

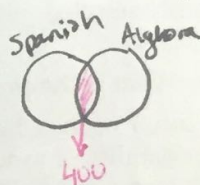
$$P(Q \text{ or } a \heartsuit) = \frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52}$$

Q ♥ Q & ♥

Ex: A school with 1400 students has 550 in Spanish, 700 in Algebra and 400 are in both.

$$P(\text{Spanish or Algebra})$$

$$= \frac{550}{1400} + \frac{700}{1400} - \frac{400}{1400}$$



$$= \frac{850}{1400} = \frac{17}{28}$$

Check for Understanding

Concept Check 1. **OPEN ENDED** Describe two mutually exclusive events and two inclusive events.

2. **Draw a Venn diagram to illustrate Example 3.**

3. **FIND THE ERROR** Refer to the comic below.

The Born Loser®

Read



Why is the weather forecaster's prediction incorrect?

Guided Practice A die is rolled. Find each probability.

4. $P(1 \text{ or } 6)$ $\frac{1}{3}$

7. $P(\text{prime})$ $\frac{1}{2}$

5. $P(\text{at least } 5)$ $\frac{1}{3}$

8. $P(\text{even or prime})$ $\frac{5}{6}$

6. $P(\text{less than } 3)$ $\frac{1}{3}$

9. $P(\text{multiple of } 2 \text{ or } 3)$ $\frac{2}{3}$